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Translation

JGU-105

UTILITY MODEL REGISTRATION REQUEST

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Patent Office Chief Examiner: Fumitake Yoshida

1. Title of the Idea

   A Sheet-form Gasket

2. Number of Claims: 2

3. Originator

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6. Appended Documents

(1)	Power of Attorney	1
(2)	Detailed Description	1
(3)	Figures	1
(4)	Duplicate of Request	1

SPECIFICATION

1. Title of the Idea

A Sheet-form Gasket

2. Claims

(1) A sheet-form gasket which is characterized by the fact that multi-directionally drawn porous polytetrafluoroethylene films are laminated into a single unit so that the apparent specific gravity is 0.3 to 1.5 and the thickness is not less than 0.5 mm.

(2) The sheet-form gasket according to Claim 1, wherein the multi-directionally drawn porous polytetrafluoroethylene films are laminated into a single unit around the periphery of an organic or inorganic core material.

3. Detailed Description of the Idea

Object of the Idea

The present idea concerns a sheet-form gasket, and offers a gasket with superior chemical resistance and heat resistance, and with which a tight seal can be formed relatively easily, and with which there will be little damage to the gasket material, the pipe flanges, etc.

(Field of Industrial Utilization)

A gasket having superior chemical resistance and heat resistance, and with which the formation of a seal is both easy and precise.

(Prior Art)

In plants where highly corrosive fluids are handled, such as in chemical plants, fluorine resin gaskets and the like, which have excellent chemical resistance, are used in at the connection points and similar locations in pipes and machinery.

But when used alone, these fluorine resin-based gaskets generally require a high tightening force in order to achieve as tight seal, and this strong tightening force results in damage to the gasket material, as well as to the tightening locations of the pipe flanges being bound, and to bolts, nuts, and other fasteners. Moreover, the load from the pressure causes these fluorine resin-based gaskets to undergo cold flow, thereby changing their shape, and here again there is a decrease is sealing.

Thereupon, in an effort to eliminate the drawbacks inherent in these fluorine resin-based simple gaskets, 1) for example, an asbestos sheet, rubber, or the like is wrapped in a fluorine resin film material to form a gasket material having resilience and chemical resistance, or 2) another filler is added to a fluorine resin to suppress cold flow. Alternatively, 3) the above-mentioned fluorine resin is drawn into a rod or string shape, and a material is used which has a flexible, marshmallow-form makeup, or a tape-form material is used.

(Problems Which the Idea Attempts to Solve)

However, the above conventional gasket materials cannot always be made satisfactory.

Specifically, the above 1) is disadvantageous in that long-term use results in a deterioration of the elastic body which originates in the gas permeability of the fluorine resin, thereby decreasing the sealing characteristics, and with the above 2), because the chemical resistance will vary depending on what kind of filler is used, gaskets must be kept on hand with various fillers depending on the fluid to which the gasket is to be applied. In the case of a flexible, marshmallow-form rod, there is a high probability that leaks will be generated around the connecting points, and working [the rod] into narrow crevices is difficult, while in the case of tape-form [material], because it is [a material] which has been unidirectionally drawn in order to form it into a tape form, the tensile strength in the direction perpendicular to the drawing direction is low, being no more than about one-tenth that in the drawing direction, and because of this, internal pressure tends to cause cold flow, and because there is a limit to the maximum value for the width of the finished product, there will be a limit to the [possible] punching dimensions of the gasket thus obtained.

Constitution of the Idea

(Means Used to Solve the Above-Mentioned Problems)

The present idea was conceived after studying ways to eliminate the problems inherent in the past, like those discussed above, and is as follows.

(1) A sheet-form gasket which is characterized by the fact that multi-directionally drawn porous polytetrafluoroethylene films are laminated into a single unit so that the apparent specific gravity is 0.3 to 1.5 and the thickness is not less than 0.5 mm.

(2) The sheet-form gasket according to Claim 1, wherein the multi-directionally drawn porous polytetrafluoroethylene films are laminated into a single unit around the periphery of an organic or inorganic core material.

(Effect of the Idea)

By utilizing a multi-directionally drawn porous polytetrafluoroethylene film, a material of suitable width can be prepared, and as a consequence, there will, as a general rule, be no limitations placed on the dimensions of the finished product. And the desired thickness can be formed by then laminating several of these films into a single unit, and furthermore, the porous construction of these films allows a good state [translator's note: uncertain translation] of compression during tightening.

Specifically, an effective seal is possible without requiring excessive tightening force, so that even in sealing locations such as easily damaged flanges, including, for example, hard synthetic resins or ceramic pipe materials, the sealing can be done without applying any needless force. Moreover, a good seal can be achieved even under conditions in which the flange has a rough surface or has a certain amount of irregularity.

By keeping the apparent specific gravity of the laminated and unified gasket to at least 0.3, a corresponding density will be formed in the structure fibrillate by the drawing, making possible a compressing seal. And by keeping the apparent specific gravity to 1.5 or less, a good porosity can be formed in the gasket, the desired state [uncertain translation] of compression can be obtained, and [the gasket] will be flexible.

By keeping the thickness to at least 0.5 mm, the proper degree of sealing can be effected in the flange and other areas.

And by using an organic or inorganic core material, the proper shape can be maintained, or the sealing effect can be ensured by forming an appropriate thickness and endowing [the gasket] with cushioning properties. Moreover, the creep resistance of the gasket is enhanced.

(Practical Examples)

To describe the mode of implementation of the above-mentioned present idea, two representative examples of the gasket obtained with the present idea are shown in Figure 1, A and B, with the gasket 1 being formed in either a square or circular shape with a hole in the middle; also shown in C, D, E, and F of the same figure are gaskets having rectangular, oval, and other different shapes. The gasket can also be formed with more than one hole 2, or with the through holes 3 formed around the edge, through which bolts can be passed between the flanges, etc.

The material used to obtain such a gasket 1 has a microfiber structure like the one shown as a typical example in Figure 2, i.e., the countless microscopic fibers 11, which are a result of fibrillation between the numerous microscopic nodules 12 by subjecting a polytetrafluoroethylene film to a drawing treatment in the up and down direction and left-to-right direction, are formed in a web form, as shown in Figure 2, with the pore diameter thereof generally being 0.01 to 15 μm, with 0.02 to 10 μm being preferable, and the porosity generally being 5 to 90%, with 25 to 85% being preferable. The thickness thereof is generally 10 to 500 μm, with 15 to 300 being preferable, and several sheets of this porous material are laminated into a single unit to produce a material used in a gasket. The thickness of this gasket material is at least 0.5 mm, with 0.5 to 10 mm being preferable, and 0.5 to 4 mm being ideal, and the apparent specific gravity should generally be 0.3 to 1.5.

An organic or inorganic, woven or non-woven cloth or sheet material is then interposed as a core material between the above-mentioned porous films 5 as shown in Figure 3, and the edge surfaces thereof are covered with the above-mentioned porous film 5. For instance, a stainless steel cloth, a glass cloth, or a woven cloth of polytetrafluoroethylene drawn in intersecting directions, or as a sheet material, a stainless steel, ceramic, or polytetrafluoroethylene film can be used, with this core material serving to enhance the creep resistance of the gasket thus obtained, helping to form the desired thickness, and providing a desirable cushioning effect.

In the above-mentioned drawn, porous film like that in Figure 2, the drawn, porous structure provides flexibility and allows [the gasket] to adapt to contact surfaces, such as the flange surface, that are rough, and to have excellent shape conformity. This drawn, porous structure also is microscopic, as mentioned above, and by appropriately clamping down on this, the leakage of gases and fluids can be effectively prevented.

The leakage of fluids can generally be effectively prevented with a tightening force of 175 to 1300 kg/cm^2, and the leakage of gases can also be effective prevented by providing [more] tightening force. A structure which has been fibrillated through a drawing treatment as above will have enhanced tensile strength, with this tensile strength being three times or more greater than that of conventional simple polytetrafluoroethylene gaskets after tightening, thereby effectively suppressing the generation of cold flow.

And because, as a general rule, there is no limitation on the size of the material, large sheet materials can be obtained at will, and because [the material] is 100% polytetrafluoroethylene, the chemical resistance is excellent, and [the gasket] can be used over a wide range of temperatures from -240°C to +260°C.

(Merits of the Idea)

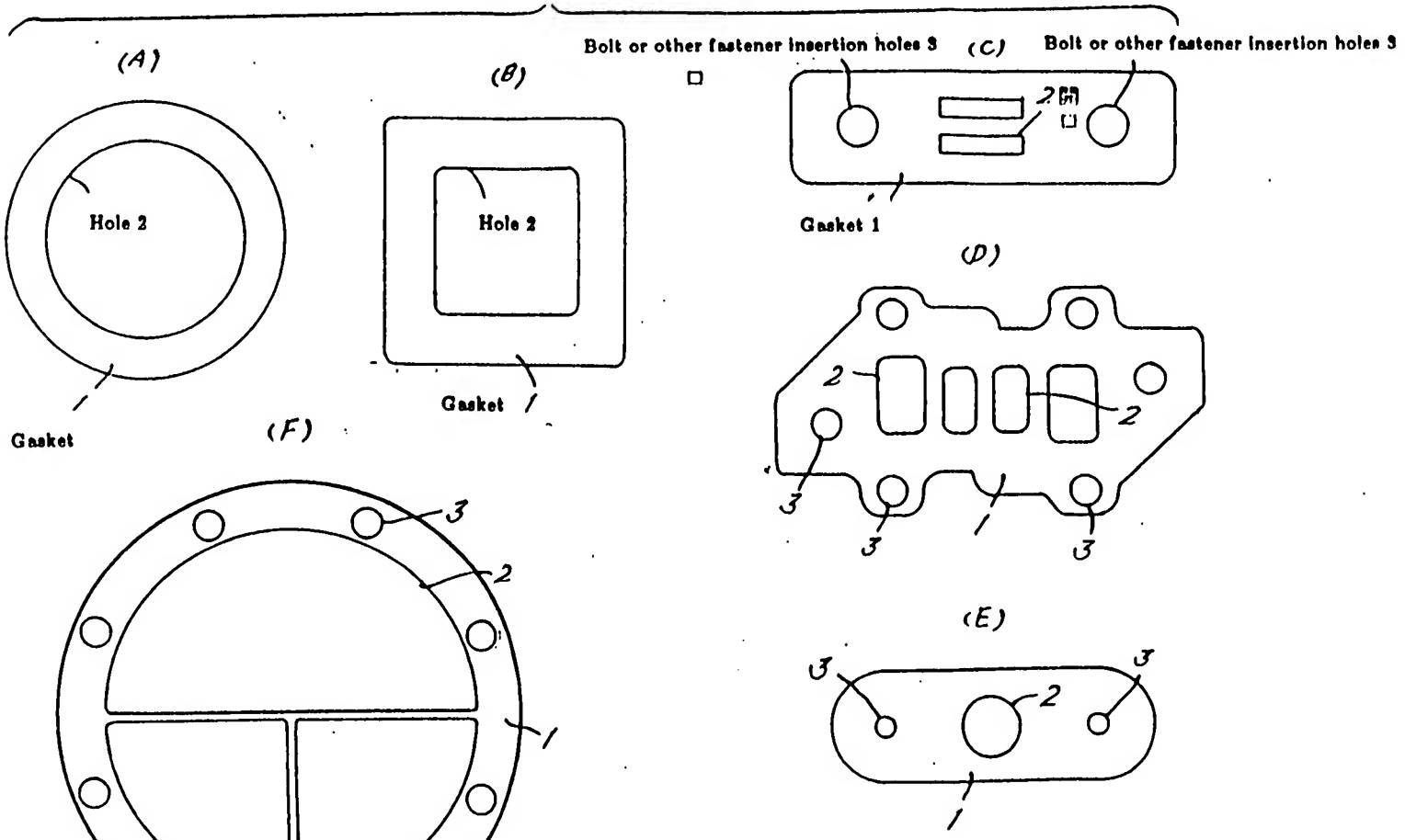
With the present idea as described above, because a multi-directionally drawn porous polytetrafluoroethylene film is used, the tensile strength and other characteristics of the material due to the change to drawn fibers are thoroughly enhanced, and a finished product that is characterized by no orientation can be obtained easily and at will. Furthermore, this product will have excellent chemical resistance, and can be used over an exceedingly wide range of temperatures. In addition, the present idea is characterized in that because [the gasket] has suitably appropriate flexibility and an effective seal can be formed can be formed with relative ease, not only is it easy to use, but no damage to the sealed locations will be in evidence, and the generation of cold flow and the like in the polytetrafluoroethylene can be effectively avoided, making idea extremely beneficial in practical terms.

4. Brief Description of the Figures

The figures illustrate the technological details of the present idea; Figure 1 is a plane view showing a few examples of the gasket of the present idea. Figure 2 is a microscope photograph showing the fiber structure of the multi-directionally drawn porous polytetrafluoroethylene film used in the present idea. And Figure 3 is an expanded, partial oblique view of the interposed core material.

In these figures, 1 is the gasket, 2 is the hole or holes therein, 3 is the bolt or other fastener insertion holes, 4 is the core material, 5 is the polytetrafluoroethylene porous film, 11 is the microscopic fibers, and 12 is the microscopic nodules.

Figure 1


(A)
Hole 2
Gasket
(B)
Hole 2
Gasket
Bolt or other fastener insertion holes 3
(C)
Bolt or other fastener insertion holes 3
Gasket 1
(D)
(E)
(F)

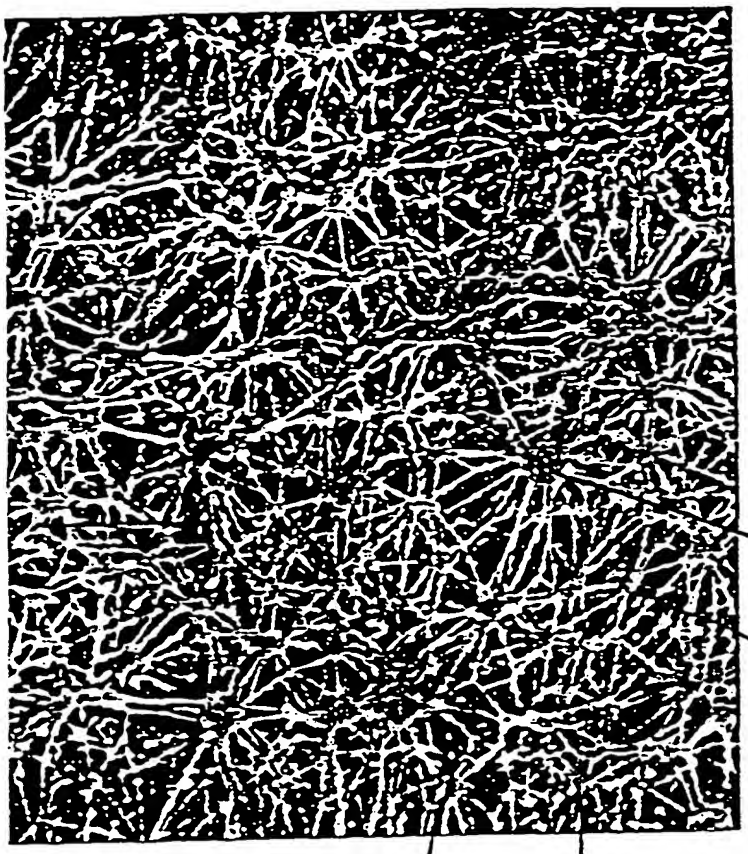


Figure 2

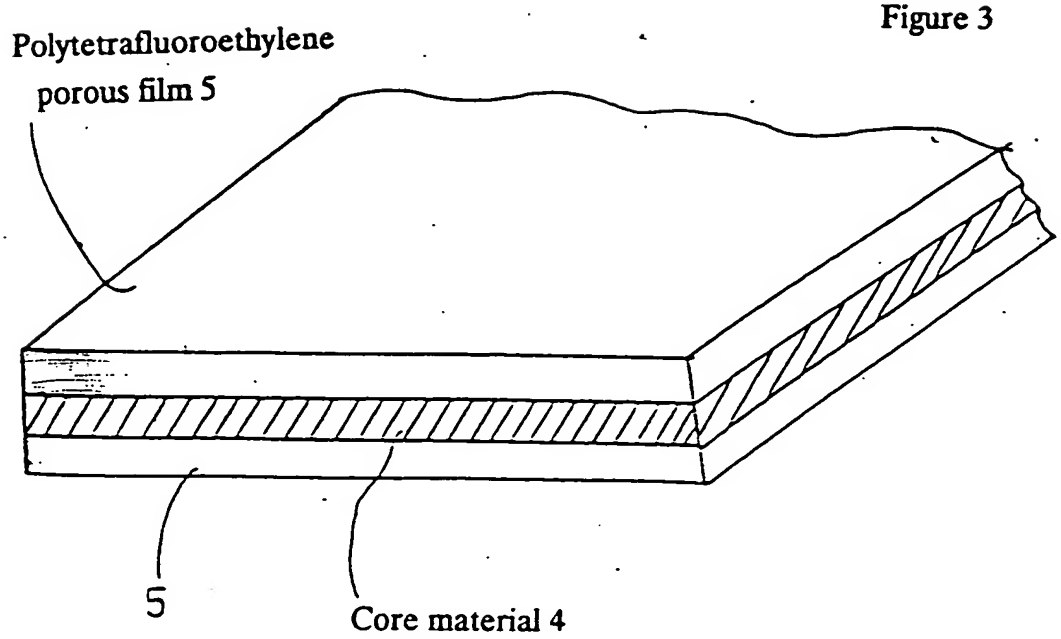


Figure 3